Analysis of Paired Data: Crash Test Scores

Crash-test dummies were placed in the driver's seat and front passenger's seat of a new car model and the car was steered by remote control into a head-on collision with a fixed barrier while traveling at 35 miles per hour. A chest injury severity score was assigned to the two dummies after each crash; higher scores represent more severe injuries. The experiment was carried out for 98 randomly-selected new car models. The National Highway Traffic Safety Administration wants to determine if the mean passenger chest injury rating exceeds that of the driver.

DOORS	DOOR2	CLASS	MAKE	MODEL	WEIGHT	DRIVSTAR	PASSSTAR	DRIVAIR	PASSAIR	DRIVCHST	PASSCHST	Diff
4	0	Mini	Geo	Metro	1986	4	4	Y	Y	52	55	-3
4	0	Light	Ford	Aspire	2086	4	4	Y	Y	53	52	1
2	1	Light	Honda	Civic	2313	4	4	Y	Y	46	45	1
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.												
.												
3	0	Van	Toyota	Previa	3644	4	3	Y	Y	58	60	-2

Descriptive Statistics: DRIVCHST, PASSCHST, Diff

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Variable    N     Mean   StDev  Minimum       Q1  Median       Q3  Maximum
DRIVCHST   98   49.663   6.670   34.000   45.000  50.000   54.000   68.000
PASSCHST   98   50.224   7.107   35.000   45.000  50.500   55.000   69.000
Diff       98   -0.561   5.517  -15.000   -4.000   0.000    3.000   13.000
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## One-Sample Z: Diff

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Test of mu = 0 vs < 0
The assumed standard deviation = 5.517


                                    95% Upper
Variable    N     Mean  StDev  SE Mean     Bound      Z      P
Diff       98   -0.561  5.517    0.557     0.355  -1.01  0.157
```

Analysis of Paired Data: Corn Yield

A farmer wants to see if there is a difference in average yield between two varieties of corn (variety A and variety B) he is considering. In order to compare the two varieties, he prepares a two-acre plot on each of seven randomly-selected farms. On each plot he plants variety A on one acre and variety B on the acre right next to it. At harvest time, he measures the yield (in bushels) on each of the acre plots.

Farm	YieldA	YieldB	Diff
1	148.2	141.5	6.7
2	144.6	141.0	3.6
3	149.7	144.0	5.7
4	140.5	141.2	-0.7
5	154.6	153.0	1.6
6	147.1	141.7	5.4
7	151.4	146.8	4.6
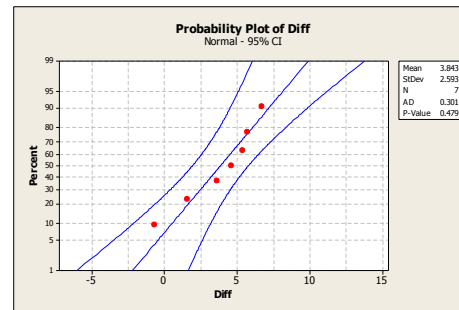
Paired T-Test and CI: YieldA, YieldB

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Paired T for YieldA - YieldB


                N      Mean     StDev   SE Mean
YieldA          7   148.014     4.595     1.737
YieldB          7   144.171     4.416     1.669
Difference      7   3.84286   2.59285   0.98000


95% CI for mean difference: (1.44487, 6.24084)
T-Test of mean difference = 0 (vs not = 0): T-Value = 3.92   P-Value = 0.008
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Two-Sample T-Test and CI: YieldA, YieldB

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Two-sample T for YieldA vs YieldB

         N     Mean   StDev   SE Mean
YieldA   7   148.01    4.59       1.7
YieldB   7   144.17    4.42       1.7


Difference = mu (YieldA) - mu (YieldB)
Estimate for difference:  3.84286
95% CI for difference:  (-1.40531, 9.09103)
T-Test of difference = 0 (vs not =): T-Value = 1.60   P-Value = 0.137   DF = 12
Both use Pooled StDev = 4.5063
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